DOCUMENT RESUME

ED 085 793 CS 500 531

AUTHOR Eli, Jack C.
TITLE Multivariate Analysis in Communication Research--Regression.
PUB DATE Oct 72
NOTE 10p.; Paper given at the Annual Meeting of the Texas Speech Association (San Antonio, October, 1972)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Communication (Thought Transfer); Communication Skills; Educational Research; *Multiple Regression Analysis; *Research Methodology; Research Problems; Research Skills; *Research Tools

ABSTRACT

Multiple regression analysis is not beyond the reach of most researchers and research classes. It may prove beneficial to the communication researcher for a number of reasons. One of its most significant contributions to effective research is the utility of looking at several variables simultaneously. Another contribution of multiple regression analysis is the various types of data that may be analyzed. The researcher may study mutually exclusive dichotomous scores depicting group membership as a variable. The researcher may also study continuous variables such as test scores or ages of subjects. Another characteristic of multiple regression analysis is its ease of application to field studies. The major weakness of multiple regression analysis lies in its assumption of causality. The major method for controlling this deficiency lies in the logic of the research design. The design should include all of the recognized independent variables and may be discovered through two approaches. The first approach is to review the literature relevant to an area of research, discerning from past studies what the major independent variables have been. The second approach involves using factor analysis and multiple regression as complements to one another. (WR)

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ED 085793

MULTIVARIATE ANALYSIS IN COMMUNICATION RESEARCH--REGRESSION

By

Jack C. Eli

Assistant Professor of Speech

Angelo State University

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MULTIVARIATE ANALYSIS IN COMMUNICATION RESEARCH--REGRESSION

Although speech has been defined in a number of ways since the days of Aristotle, the purpose or function of speech has remained somewhat constant--that is to persuade. Most communication theorists agree with David Berlo that:

> In short, we communicate to influence--to affect with intent. In analyzing communication, in trying to improve our communication ability, the first question we need to ask is, what did the communicator intend to have happen as a result of his message? What was he trying to accomplish in terms of influencing his environment? As a result of his communication, what did he want people to believe, to be able to dc, to say? In psychological terms, what response was he trying to obtain?[1]

A great deal of communication research, therefore, has attempted to identify "all the available means of persuasion."

In the early years of the twentieth century, communication research classes historically and sometimes even critically analyzed public speeches of great heroes--both living and dead. The fruits of their labor often ended with descriptive analyses of why, to what extent, and how well a speaker employed ethos, pathos and logos. As the scope of communication theorists broadened and the availabilty of virgin public speakers narrowed, new approaches to communication research gained acceptance.

The entire process has evolved to the point that today it is quite common to find research classes devoted almost entirely to experimental and quasi-experimental research. The evolution of communication research has progressed from historical to critical to experimental to quasi-experimental.

In the early experimental stage, communication theorists were quite happy to retain the basic drives of their predecessors by measuring the potency of "all the available means of persuasion." These investigations were usually carried out in the sterile environment of a scientific laboratory or classroom, and usually allowed the researchers to generalize about the effects of specific persuasive appeals to college freshmen in specified environmental settings.

As these renegade theorists (later to be called behaviorists) matured and began developing communication theories, it became increasingly evident that the traditional experimental design pre-test, treatment, post-test) was sometimes inadequate in the investigations of a complex phenomenon such as communication. It proved inadequate because of the limited number of varibles that can be analyzed at one time in the traditional design. Instead of manipulating one variable such as ethical appeal, researchers wanted to be able to investigate many--such as demographic data, both in the source and receiver, message variation, and channel variations in order to ascertain the effect of all these variables at one point in time. In other words, the stimulus-organism-response paradigm for research was replaced with a stimuli-organisms-responses paradigm.

The stimuli-organisms-responses paradigm is based on the assumption that verbal behavior is a function of several additive independent variables. For illustrative purposes, consider the suggestion that a person's verbal behavior may be primarily a function of his attitudes, knowledge, communication skills,

social systems, and culture. In order to test that complex a model, one would necessarily employ multivariate analysis. Multivariate analysis may be defined as the investigation of a number of independent and dependent variables simulatenously.

There are four major techniques of multivariate analysis prevalent in communication research today. These are multiple discriminant analysis, canonical correlation, factor analysis, and multiple regression analysis. Multiple regression analysis seems to be most applicable to a wide range of communication research problems. For a detailed look at multiple regression, see Research Design in the Behavioral Sciences: Multiple Regression Approach by Kelly et. al.[2]

In its simplest form, multiple regression analysis is a statistical technique which allows for the prediction of an estimate of an unknown value on the basis of one or more known values. Translated into research terminology, multiple regression analysis allows the researcher to predict the score of a dependent variable from the scores of one or more independent variables.

Suppose, for instance, that one knows that speaker credibility (the independent variable) and persuasive results (the dependent variable) are positively correlated. Further suppose that one has a set of scores reflecting both speaker credibility and persuasive results for a large number of people. From those scores one may predict the persuasive results of any other person for whom one has a speaker credibility score.

A more complex study using this same technique might involve

an attempt to predict the success of students in a speech class. One may have discovered that there is a correlation among listening ability, class attendance, anxiety, and a student's final course grade. Given data on listening ability, class attendance, anxiety, and aptitude, one could predict how successful any given student would be in a similar speech class.

Most multiple regression programs will also determine the degree of intensity with which each independent variable affects the dependent variable. In one piece of research concerning voting behavior conducted by this writer, it was found that candidate image (an independent variable) accounted for 48.4% of the variance in voting behavior (the dependent variable); party evaluation (an independent variable) accounted for 43.6% of the variance in voting behavior (the dependent variable); and issue orientation (an independent variable) accounted for 21.4% of the variance in voting behavior (the dependent variable).[3] Therefore, of those three independent variables, in that particular situation, candidate image tended to influence voting behavior more than party evaluation or issue orientation influenced it. An F-test of significance was performed in order to determine if the independent variables significantly affected the dependent variable.

The end result of mutiple regression analysis is 1) an estimate as to how two or more variables varied together--correlation coefficient, 2) the percentage of variance in the dependent variable accounted for by the independent variable,

and 3) prediction of criterion scores based on the correlation coefficients.

Multiple regression analysis is not beyond the reach of most researchers and research classes. In fact, several multiple regression analysis computer programs are now readily available; one such computer program, REGRAN is outlined in the book Fortran Programing for the Behavioral Sciences by Donald Veldmen of the University of Texas. Program REGRAN is available at the University of Texas campus and may be employed through the time sharing program called TAURUS already installed in many high schools and universities across the state. Therefore, with the aid of a statistical consultant and book such as Veldman's, it is not unfeasible for the non-statistically trained researcher to engage in this type of research.

Multiple regression analysis may prove beneficial to the communication researcher for a number of reasons. As previously mentioned, one of its most significant contributions to effective research is the ultility of looking at several variables simultaneously. No longer is the researcher bound by univariate analysis to the investigation of simple communication models. Now he may investigate complex models with as many as ninety-nine variables, if necessary.

Another contribution of multiple regression analysis is the various types of data that may be analyzed. The researcher may study mutually exclusive dichotomous scores depicting group membership as a variable. Quite often research studies call for

dichotomous variables such as male and female differences and persuasibility or religious and non-religious persons and dogmatism. The researcher may also study continuous variables such as test scores or ages of subjects. The beauty of multiple regression is that these two types of data may be studied simultaneously.

Another important characteristic of multiple regression analysis is its ease of application to field studies. Many communicologists have argued for increasing the amount of research in natural settings, in order to understand people and their behavior as it really is--not when reconstructed in an artificial laboratory setting Field studies should make research more relevant as we study communication problems as they exist in the world today. Several factors centering around a lack of experimental control in field studies necessitate a less conventional means of designing research and analyzing data. In field research, internal and external validity suffer at the hands of the impracticality of control groups, the injection of intervening variables, and the inability to control the independent variables. Multiple regression analysis represents not only a means of analyzing data but also a type of research design in itself. That design does not depend upon such rigid controls as does traditional pre-test, treatment, post-test designs. If an intervening variable seems to be affecting the data, the researcher simply builds it into the overall research design and treats it as another independent variable in order to test its significance. Multiple regression

analysis, therefore, allows the researcher to gather data in the field, describe and better understand the phenomenon under consideration, and predict future behavior using past behavior os the basis for prediction.

The major weaknesses of multiple regression lies in its assumption of cauaslity. Multiple regression ". . . rests on the assumption that differences between measures on the dependent variable are directly caused by the independent variable."[4] This assumption is basic to all correlational studies and has caused correlation studies to come under attack from some strict experimentalists.

The major method for controlling this deficiency lies in the logic of the research design. The design sould include all of the recognized independent variables may be discovered through two approaches. The first approach is to review the literature relevant to your research. Discern from past studies what the major independent variables have been. Ascertain scores for all these variables in order to employ them in multiple regression analysis. At least in this manner, "recognized" variables which are generally accepted as causal factors of a dependent variable, may be employed.

The second approach lends itself to research which may not have been tested in the past and therefore, has little or no literature to be reviewed. This approach invólves using factor analysis and multiple regression as complements to one another. The researcher would first devise a detailed and rather complete questionaire concerning the dependent variable. Next he would

factor analyze the questionaire results in order to determine the existance of clustered responses. From the clusters, the researcher should be able to identify certain trends in each factor. Each cluster then would be labeled and employed as an independent variable in a multiple regression analysis. In this fashion, the independent variables have been supplied by the data and should be a better representation of what the important independent variables really are.

Through the implementation of multivariate techniques of research and analysis, researchers should be able to open new doors and discover new horizons. Researchers have been confined too long by their methodological techniques; multiple regression analysis offers an escape from that confinement.

FOOTNOTES

[1]D. K. Berlo, The Process of Communication (New York: Holt, Rinehart, and Winston, 1960). p. 12.

[2]Francis J. Kelly, et. al., Research Design in the Behavioral Sciences: Multiple Regression Analysis (Carbondale, Illinois: Southern Illinois University Press).

[3]Jack C. Eli, "A Study of Political Attitudes and Voting Behavior in the 1970 Tennessee Gubernatorial Election" (unpublished Ph.D. dissertation, Southern Illinois University, 1971).

[4]Francis J. Kelly, "Multivariate Design Considerations," in Methods of Research in Communication, ed. by Philip Emmert and William D. Brooks (Boston: Houghton Mifflin Company, 1970), p. 52.